



A CLINICOEPIDEMIOLOGICAL STUDY OF MATERNAL NEAR MISS IN A TERTIARY CARE CENTRE

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ABSTRACT

Background And Objective: Maternal deaths occupy the 'tip of an iceberg' with the base being occupied by severe acute maternal morbidity, in that major proportion of women survive complications in pregnancy than the ones dying of complications. Delay in seeking care, reaching care and receiving care are important contributors for severe acute maternal morbidity (SAMM) in critical care pregnancy or post-partum complications. To study the prevalence and the impact of socio demographic characteristics in SAMM to evaluate causes and the level of delay responsible for MNM. **Materials & Methods :** A hospital based prospective study from 1 January 2018 to 31 December, 2018. Near miss antenatal, intranatal & postnatal patients within 42 days of termination of the pregnancy attending the Emergency/Casualty of department of Obstetrics & Gynaecology of Maharishi Markandeshwar Institute Of Medical Sciences & Research (MMIMSR), Mullana, Ambala, Haryana, India were evaluated after obtaining informed consent. WHO maternal near miss criteria was used for selection of patients. **Results:** A total of 3966 live births and 54 maternal near miss cases occurred in the study period with prevalence 1.36% . Maximum were in the age group 21-35 years. Mean age was 27.07 years and 81.5% cases were unbooked .72.2% were from low socioeconomic status and 44.4% were illiterate. Anaemia was the contributory factor in 87% of Near Miss cases. Haemorrhage was the most common direct cause in 53.7% cases with hypertension being second commonest in 33.3% cases followed by sepsis in 5.5%. 61.1% required ICU admission and 33.3% patients received massive blood transfusion. Delay in seeking care was present in 72.2% while 14.8% each had delay in reaching care or receiving care. **Conclusion:** Unbooked pregnancies, low socioeconomic status, multiparity, illiteracy and delay in seeking care were major factors responsible for near miss mortality. The delay in reaching or receiving care also was contributory factor for high burden of maternal morbidity in developing countries. Regular antenatal care with counselling of both partners regarding danger signs and early referral with free easy transport, women education and empowerment with no delay in receiving care remains the key to successful management prevention of SAMM.

KEYWORDS

Eclampsia; Haemorrhage; Maternal deaths; Maternal near miss; Severe acute maternal morbidity.

INTRODUCTION

A Maternal Near Miss is a woman who nearly died but survived a complication that has occurred during pregnancy, childbirth or within 42 days of termination of pregnancy^[1,2]. Maternal deaths occupy the 'tip of an iceberg' with the base being occupied by severe acute maternal morbidity, in that major proportion of women survive complications in pregnancy than the ones dying of complications^[3,4]

Maternal mortality ratio (MMR), the number of maternal deaths during a given time period per 100 000 live births within the same period of time remains the primary indicator for maternal health care^[5]. MMR of India 130/1,00,000 live births and of Haryana was 101/1,00,000 live births(SRS Survey 2016) with all set to achieve sustainable developmental Goal to reduce 70/1,00,000 by 2030. Maternal near miss remains a better option to device measures to reduce MMR as woman herself is available to explain the quality of care received for severe complication of pregnancy.^[6]

Direct maternal deaths are those resulting from obstetric complications of the pregnancy (during pregnancy, delivery and postpartum), interventions, omissions, incorrect treatment, or a chain of events resulting from any of the above, for example deaths due to obstetric haemorrhage or hypertensive disorders in pregnancy or sepsis, due to complications of anaesthesia or caesarean section while indirect maternal deaths result from previously existing diseases or from diseases that developed during pregnancy and that were not due to direct obstetric causes but aggravated by physiological effects of pregnancy like deaths due to aggravation of an already existing cardiac, renal, liver disease, HIV, anaemia and malaria^[5].

The gaps in access to obstetric emergency management are due to delay in seeking care, reaching care or receiving care. Harmful

traditional practices, low socioeconomic status of the patient, inability to diagnose the disease at appropriate time, indecisiveness in seeking health care and delayed departure from home to the health care facility are important factors for delay seeking care. Delay in reaching the referral facility may be due to absence of proper roads and transportation or lack of facility within reasonable distance from home. Delay within the facility-both diagnostic and therapeutic, delayed interdepartmental transfer, lack of supplies or equipment's or mismanagement or human error are important contributors to delay in receiving care for critically sick pregnant or postpartum patients.^[7]

Severe maternal morbidity or the "potentially life-threatening conditions"(PTLCs) is an extensive category of clinical conditions which include diseases that can threaten a woman's life during pregnancy, labour or after termination of pregnancy. Severe preeclampsia, HELLP syndrome, Antepartum or Postpartum Haemorrhage, rupture Uterus and severe sepsis are direct causes for PTLCs or maternal morbidity.^[8]

To identify and notify MNM as per Ministry of Health and family Welfare, India : The following criteria must be met with: Clinical features (symptoms or signs), Investigations and Interventions, minimum one from each category or Any single criteria which signifies cardio respiratory collapse.^[9]

MATERIALS AND METHOD

A hospital based prospective study was conducted in department of Obstetrics & Gynaecology of Maharishi Markandeshwar Institute of Medical Sciences and Research (MMIMSR), Mullana, Ambala, Haryana, India between 1 January, 2018 to 31 December, 2018. All maternal near miss fulfilling at least one clinical, laboratory and interventional criteria were included in the study as per WHO recommendations.

WHO near miss criteria**1) Clinical criteria**

- Acute cyanosis
- Gasping
- Respiratory rate > 40 or < 6/min
- Shock
- Oliguria non responsive to fluids or diuretics
- Failure to form clots
- Loss of consciousness lasting > 12 h
- Cardiac arrest
- Stroke
- Uncontrollable fit/total paralysis
- Jaundice in the presence of pre-eclampsia

2) Laboratory-based criteria

- Oxygen saturation < 90% for ≥ 60 minutes
- PaO₂/FiO₂ < 200 mmHg
- Creatinine ≥ 300 µmol/l or ≥ 3.5 mg/dL
- Bilirubin > 100 µmol/l or > 6.0 mg/dL
- pH < 7.1
- Lactate > 5 mEq/mL
- Acute thrombocytopenia (< 50,000 platelets/ml)
- Loss of consciousness and ketoacids in urine

3) Management-based criteria

- Use of continuous vasoactive drugs
- Hysterectomy following infection or haemorrhage
- Transfusion of ≥ 5 units of blood
- Intubation and ventilation for ≥ 60 minutes not related to anaesthesia
- Dialysis for acute renal failure
- Cardio-pulmonary resuscitation

Inclusion Criteria:

Antenatal, intranatal & postnatal patients within 42 days of termination of pregnancy event who fulfilled WHO criteria for maternal near miss were recruited in the study after obtaining written informed consent on the pre-structured proforma.

Exclusion Criteria:

All the patients with pre-existing medical illnesses like cardiovascular disorders, respiratory disorders, CNS disorders and renal diseases were excluded from the study.

Statistical Analysis:

The collected data was entered in Microsoft Excel and then analysed and statically evaluated using SPSS-PC-20 version.

OBSERVATIONS & RESULTS

There were a total of 3966 live births with 54 MNM in the study period. The maternal near miss incidence ratio was 13.6 per 1000 live births and the prevalence was 1.36%. Mean maternal age was 27.07±5.80 years (table-1). Majority of near miss mortality i.e. 47 (87%) in third decade of life, between 21 and 35 years of age, four patients (7.4%) were ≤ 20 years of age while only three (3.4%) were > 35 years. 44.4% near miss cases were illiterate while 14 (26.0%) were 10th pass and above. 72.2% of near miss cases were from lower socio-economic status. Eight patients i.e. 14.8% were from lower middle and Seven (13.0%) were from upper lower class. 50.0% of the patients were Muslims while 42.6% Hindus and four patients were Sikhs.

Eight (24.2%) were either primi or third gravida. Only Six (18.2%) of the study subjects were gravida 5 and above. 44 patients (81.5%) were unbooked unsupervised pregnancies with only total 10 patients being booked and 13.0% cases (seven patients) received antenatal care in peripheral hospitals while three were booked in our institute.

59.3% became near miss in antenatal period with majority of them (44.4%) in third trimester 12.9% in the first trimester and 1.8% patients in second trimester. Only one patient i.e. 1.9% became near miss in intranatal period and 21 cases (38.9%) in the postnatal period (Table-2). 21 patients became near miss during postpartum period. 81.5% near miss cases were referred from outside while only 10 cases (18.5%) became MNM during their stay in our tertiary care hospital.

Maximum near miss patients i.e. 22 (40.7%) had vaginal delivery while nineteen (35.2%) underwent cesarean section. Laparotomy

followed by for peripartum hysterectomy in 6 (11.1%) and laparotomy for ruptured ectopic pregnancy in five (9.3%) cases. Two cases were post suction and evacuation.

Majority of MNM 87%(47) were anaemic. Anaemia was moderate (7-9 gm/dl) in twenty (37.0%) cases while it was severe (< 7 gm/dl) in fourteen (25.9%) cases and very severe anaemias (4 gm/dl) was seen in eleven (20.4%) cases. Haemorrhage was the cause in 29 cases followed by hypertensive disorder of pregnancy including severe preeclampsia in 12 (22.2%) and eclampsia in 18 (11.1%). Renal dysfunction in seven (13.0%), sepsis and cardiac dysfunction in three (5.5%) each, two (3.7%) had tubercular meningitis and anaphylactic shock in one case (1.9%) (Table-3). As per WHO clinical criteria, Shock was the commonest clinical parameter in fourteen cases (25.9%) followed by Oliguria not responding to fluids or diuretics in seven (13%). Other clinical parameters were: Respiratory rate > 40 or < 6 breaths per minute in four (7.4%), Jaundice in the presence of pre-eclampsia in four (7.4%), Cardiac arrest in two (3.7%), loss of consciousness lasting for > 12 hours in two cases (3.7%), stroke in one case (1.9%) and one (1.9%) was in gasping state (table-4). As per WHO laboratory criteria, raised serum creatinine ≥ 3.5 mg/dL was observed in seven patients (13.0%), acute thrombocytopenia (< 50,000 platelets) and O₂ saturation < 90% for > 60 min which were seen in three cases (5.6%) cases each. Serum bilirubin > 6 mg/dl was in two patients (3.7%) and Blood pH < 7.1 in one case (1.9%) (table-5).

According to WHO based criteria, 33 near miss cases (61.1%) required ICU admission followed by massive blood transfusion (> 5 Blood transfusion) in 18 cases (33.3%). Ventilatory support was required in fourteen (25.9%) and use of inotropic drugs in ten cases (18.5%). Dialysis of AKI patients in seven cases (13.0%) and peripartum hysterectomy was performed in five near miss (9.3%) (table-6).

Type 2 (delay in reaching health care centre) was seen in 39 (72.2%) maternal near miss. Type 1 delay (delay in seeking care) was in 22 (40.7%) cases and delay in receiving care was seen in 14.8% cases (Table-6). Out of 44 MNM cases referred from outside, 24 (54.5%) travelled between 51-100 km to reach our hospital while 19 (43.2%) travelled less than 50 km and one patient travelled ≥ 100 km to reach our tertiary care centre. Out of total 54 MNM cases, 39 cases (72.2%) took more than two to six hours to reach our centre, while 15 (27.7%) reached the facility within two hours (table-7).

Table 1 : Prevalence of maternal near miss cases in our tertiary care centre

Total number of near miss cases	54
Total Number of live births	3966
Maternal near miss incidence ratio	13.6 per 1000 live births
Prevalence	1.36%

There were 54 maternal near miss cases and 3966 live births in the study period. The maternal near miss incidence ratio was 13.6 per 1000 live births and the prevalence was 1.36%.

Table 2: Population characteristics

Age distribution of maternal near miss cases		
Age in years	Number (N= 54)	Percentage(100%)
≤ 20 years	4	7.4
21-35 years	47	87.0
>35 years	3	5.6
Socioeconomic status of maternal near miss cases according to modified Kuppuswamy scale		
Socioeconomic status	Number (N=54)	% (100%)
Lower	39	72.2
Upper Lower	7	13.0
Lower middle	8	14.8
Upper middle	0	0
Upper	0	0
Distribution of maternal near miss cases according to Religion		
Religion	Number (N=54)	%
Muslim	27	50.0
Hindu	23	42.6
Sikh	4	7.4
Gravida wise distribution of maternal near miss cases		
Gravida	Number (N=33)	Percentage (100%)
Primigravida	8	24.2
G2(Gravida-2)	6	18.2

G3(Gravida-3)	8	24.2
G4(Gravida-4)	5	15.1
G5(Gravida -5)	6	18.2
Distribution of maternal near miss cases according to Booked/unbooked history		
Booked/unbooked history	Number (N=54)	% (100%)
Booked	10	18.5
Booked in our institute	3	5.6
Booked in peripheral hospitals	7	13.0
Unbooked	44	81.5
Distribution of maternal near miss cases according to number of antenatal care visits		
ANC visits	Number (N=54)	Percentage (%)
No ANC visit	24	44.4
Erratic ANC visits	20	37.1
Regular ANC visits(≥ 4 visits)	10	18.5
Distribution of MNM in relation to period of morbidity		
	Number (N=54)	Percentage (100%)
Antenatal	32	59.3
13 weeks	7	12.9
13-28 weeks	1	1.8
>28 weeks	24	44.4
Intranatal	1	1.9
Postnatal	21	38.9

Table-3 Distribution in relation to the cause of Maternal Near Miss

Cause of near miss	Number (N=54)	% (percentage)
Anaemia	47	87
Haemorrhage	29	53.7
Hypertension in pregnancy	18	33.3
Severe Preeclampsia	12	22.2
Eclampsia	6	11.1
renal dysfunction	7	13.0
Sepsis	3	5.5
Cardiac dysfunction	3	5.5
Tuberculous meningitis	2	3.7
Anaphylaxis	1	1.9

Table-4 Distribution of MNM in relation to clinical organ dysfunction criteria

Clinical organ dysfunction criteria	Number (N=54)	Percentage (%)
Shock	14	25.9
Respiratory rate >40 or <6 breaths per minute	4	7.4
Cardiac arrest	2	3.7
Any loss of consciousness lasting for >12 hours	2	3.7
Stroke	1	1.9
Jaundice in the presence of pre- eclampsia	4	7.4
Gaspings	1	1.9
Acute cyanosis	0	0
Oliguria not responding to fluids or diuretics	7	13.0
Uncontrolled fit or status epilepticus	0	0
Global paralysis	0	0

Table-5 Laboratory criteria for identification of MNM cases

Laboratory criteria	Number (N=54)	Percentage (%)
O2 saturation <90% for >60 min	3	5.6
S. creatinine >3.5 mg/dl	7	13.0
S bilirubin >6mg/dl	2	3.7
Blood pH <7.1	1	1.9
Acute thrombocytopenia (<50,000 platelets)	3	5.6
Serum Lactate > 5 mEq/L	0	0
PaO2/FiO2 < 200 mmHg	0	0

Table-6 Management/Intervention based identification of MNM cases

Management based criteria	Number (N=54)	Percentage (%)
Massive blood transfusion (> and equal to 5 Blood transfusion)	18	33.3
ICU admission	33	61.1
Inotrope used	10	18.5
Peripartum Hysterectomy	5	9.3

Cardiopulmonary resuscitation	3	5.6
Ventilatory support	14	25.9
Dialysis for AKI	7	13.0

Table-7 Level of Delay responsible for maternal near miss cases

Delays	Number	Percentage(%)
Delay 1(Delay in seeking care)	22	40.7
Delay 2 (Delay in reaching the healthcare facility)	39	72.2
Delay 3 (Delay within the facility)	8	14.8
Lack of family planning methods	5	9.3

DISCUSSION

The total number of live births during period was 3966 with 54 Maternal Near Miss prevalence and incidence ratio was 13.6 per 1000 live births. The prevalence was 1.36%. Results were comparable to Ali et al^[10] in which maternal near miss ratio was 22.1/1000 live births.

Majority of MNMs i.e. 87% were between 20-35 years of age similar to that observed by Kumar et al^[11] in which majority (77%) were between 20-29 years age.

72.2% of near miss cases were from low socioeconomic group with no MNM among upper socioeconomic class. Results were comparable to that of Kaur N et al^[12] who reported 67.85% from low and no MNM from high socioeconomic group/class.

Maximum number i.e. 44.4% of MNM in our study were illiterate (24) comparable to study by Ali et al^[10] in which maximum number of cases 110 out of 205 (53.6%) were illiterate.

Majority (81.5%) were unbooked, only 5.6% were booked in our tertiary care centre and 13% were booked in peripheral hospitals comparable to 64.28% unbooked and 35.71% booked in study Kaur et al^[12].

44.4% patients did not receive any antenatal care. 11.4% came directly from home after intervention by an untrained personnel/dai. Majority patients were referred from secondary health facility (civil hospital, private hospitals, CHC) in critically sick condition followed by 6.8% referred from primary health facility. Pandey et al^[13] also reported that 66% cases did not receive any antenatal care and 6.5% underwent prior intervention at home, 23.4% were referred from private hospitals, 21% from district hospitals and only 8.7% from primary health care facility. 44.4% near miss patients had no antenatal check-ups, 37.1% cases had erratic ANC visits. Only 18.5% cases (10 patients) had 4 antenatal visits. Kumar et al^[11] reported 39.2% near miss cases with 4 ANC visits as compared to 32.2% cases of near miss with history of 4 ANC visits.

Maximum MNM (59.3%) were in antenatal period followed by 38.9% cases in postnatal period and only 1.9% cases in intranatal period. Pandey et al^[13] reported 83.6% near miss cases in antenatal and 13.1% in postnatal patients.

24.2% (eight cases) each were primigravida or third gravida while 18.2% (six cases) were second gravida, similar to that reported by Mekango et al^[14].

In our study, 18.2% MNMs (six cases) were grand multipara while Mekango et al^[14] reported MNM in 41.7% among grand multipara.

Majority of MNM's in our as well as Kumar et al^[11] i.e. 44.4% and 44.6% were in third trimester comparable.

As regards operative intervention, 40.7% had vaginal delivery, 35.2% had lower segment caesarean section, suction and evacuation in 3.7%, laparotomy with peripartum hysterectomy for rupture uterus or PPH in 11.1% and laparotomy for ectopic pregnancy in 9.3% and 3.7% underwent suction and evacuation. 39.5% had vaginal delivery cases and 39% had lower segment caesarean section as observed by Kumar et al^[11].

The most common direct cause for maternal near miss in our study was Haemorrhage (53.7%) and hypertensive disorders (33.3%) (severe preeclampsia and eclampsia), were most common direct causes of MNM. Study by Litorp et al^[15] also reported hypertensive disorders (16%) and haemorrhage (13%) as the leading cause of maternal near miss. Other causes were renal dysfunction 13%, chronic infections which were tubercular meningitis 5.5% each and acute blood

transfusion reaction 1.9%. Sepsis and cardiac dysfunction was there in two cases (5.5%) each. Anaemia was a contributory factor in 87% cases.

As per clinical criteria for MNM, 25.9% cases were in shock, 9.3% had oliguria not responding to fluids or diuretics, 7.4% were in respiratory distress, 7.4% had jaundice in the presence of preeclampsia, loss of consciousness lasting for > 12 hours in 3.7% and cardiac arrest was there in 3.7% cases. Pandey et al^[13] reported shock in 53% cases, respiratory distress 17.7%, clotting failure in 4% cases and loss of consciousness 11.3%.

As per management-based criteria, 61.1% required ICU admission, 33.3% received massive blood transfusion i.e. 5 or more than 5 blood or blood products, 25.9% were on ventilatory support, 18.5% patients had inotropic support, 13% required dialysis, 9.3% underwent peripartum hysterectomy and 5.6% were given cardiopulmonary resuscitation. JP Souza et al^[16] also reported ICU admission in 32.3% cases, massive blood transfusion in 7.3% cases, Emergency hysterectomy in 3.2%, ventilatory support in 0.8%.

Majority patients i.e. 39 cases (72.20%) became near miss due to delay in reaching the tertiary centre followed by 40.7% (22 cases) with near miss event due to delay in seeking care and only in 14.80% i.e. eight cases, there was delay in receiving care. Amaral et al^[17] observed that in which 32 out of 54 patients became near miss due to delay in receiving care, 23 out of 54 were near miss due to delay in seeking care and only 7 became near miss due to delay in reaching the institution.

CONCLUSION

Unbooked pregnancy, lack of antenatal care, low socioeconomic status, illiteracy have significant impact on MNM. Haemorrhage and preeclampsia – eclampsia are leading causes for MNM. Anaemia remains indirect contributory factor. Delay in reaching care and seeking care are significant factors for avoidable severe acute maternal morbidity.

Regular antenatal care with counselling for the danger signs with easy access in seeking care, reaching care and receiving care is key to prevention of MNM. Iron supplementation in adolescents, antenatal and postpartum period can prevent the avoidable factors. Repeat sensitization of health care providers regarding MNM with prompt referral to the tertiary care may save many a mothers with child- a journey to safe motherhood.

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